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Itinerary.

American Geographical Society

Friday, August 30th, 1912.

Arrive Duluth, 8:00 a. m. Leave 9:00 a. m. via the Duluth, Missabe & Northern Railway for Hibbing. Arrive Hibbing 12:00 Noon. Have lunch at Oliver Club. In the afternoon visit Hull-Rust and Mahoning Mines.

Leave Hibbing 5:00 p. m. Arrive Duluth 8:00 p. m. Transfer to Spalding Hotel.

Saturday, August 31st., 1912.

Trip on steamer up St. Louis River to new Steel Plant and Fond du Lac, leaving foot of Fifth Avenue West at 9:00 a. m.

Lunch at Northland Country Club.

After lunch, trip in automobiles over the Boulevard, Duluth.

Leave Duluth via Northern Pacific Ry. at 5:00 p. m.

IRON INDUSTRY OF MINNESOTA

¶ Data and views showing
the scope of operations
pertaining to the mining,
transportation and smelting
of Iron Ore in Northern
:: :: Minnesota :: ::

Compiled and arranged by

Oliver Iron Mining Co.
DULUTH, MINN.

1912

Printing by O. F. Collier Co.
Engravings by Duluth News Tribune Co.

Duluth, Minnesota, 1870

Duluth, Minnesota, 1912

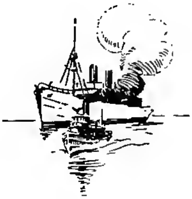
HISTORY *of* DULUTH

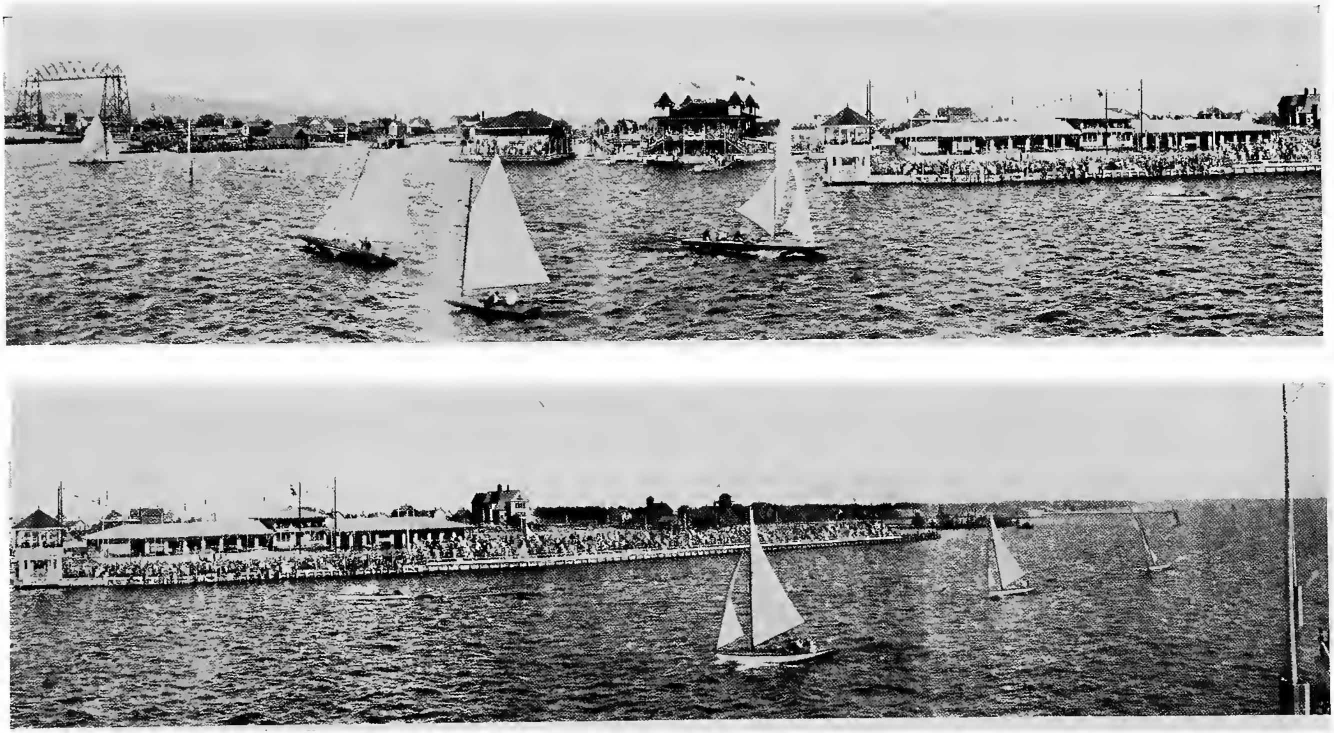
THE HISTORY of Duluth commences with Daniel de Gresolon, Sieur Dulhut, one of the explorers of the Upper Mississippi, who came to the head of the lakes in the summer of 1679. Radisson and Groseillier, and Claude Allouez, a Jesuit priest, preceeded Dulhut to the Lake Superior district, and are supposed to have visited the head of the lakes, but there is no authentic account previous to that of Dulhut.

¶ In 1792 the fur traders established a fort at Fond du Lac, on the St. Louis river, 15 miles above the present city of Duluth. In the early 50's there were a few scattered squatters at Oneota and around the George Stuntz trading post on Minnesota Point. In 1855-56 the settlement on Minnesota Point was called Duluth, commemorating the name of Dulhut.

¶ The first railroad was built to the head of the lakes in 1870. The charter for this road had been granted in 1861 to the Lake Superior and Mississippi Railroad Company, afterward called the St. Paul and Duluth, and which is now a part of the Northern Pacific.

¶ In 1870 the population of Duluth was about 1,200, and Oneota 500; 1880, 3,480; 1890, 33,115; 1900, 52,969; 1910, 78,184.





Duluth Boat Club

St. Louis County Court House, Duluth, Minnesota

Club House, Northland Country Club

Wolvin Building

—General Offices:—

Oliver Iron Mining Company	Minnesota Steel Company
Duluth & Iron Range R. R. Company	Pittsburgh Steamship Company
Duluth, Missabe & Northern Ry. Company	American Bridge Company

The IRON RANGES of MINNESOTA

THE FIRST mention of iron bearing formation in this region is by Norwood in 1852, but it was not until 1875 that we have any record of work being done to establish the economic value of the district. In this year Prof. A. H. Chester examined the Missabe range from Embarrass Lake eastward to Birch Lake. In the greater portion of the district examined by Prof. Chester, the formation is highly magnetic and has never produced bodies of merchantable ore. Shortly after attention was almost wholly diverted from the Missabe by the discovery of ore on the Vermilion range.

¶ In the early 80's, Mr. Geo. C. Stone succeeded in interesting Mr. Charlemange Tower in the ore deposits on the Vermilion range near Tower. The first shipment of ore was made in 1884. In 1886 the whole property including mines, railroad, docks, and land grant was sold to the Minnesota Iron Company and later, on the organization of the U. S. Steel Corporation, became a part of the holdings of that corporation. The first mine to be developed near Ely, 21 miles east of Tower, was the Chandler, which began shipping in the fall of 1887. Since then the Pioneer, Zenith, Sibley and Savoy have been opened in what is known as the Ely trough. A new mine called the Section 30 is being worked on another trough about 3 miles east of Ely.

¶ On the Missabe range, ore was discovered in the fall of 1890 near the present Mountain Iron mine by the Messrs. Merritt of Duluth, and in the fall of the following year on the Biwabik property by the same parties. Since these discoveries the development of this range has been phenomenal.

¶ The Cuyuna Range was located from the results of magnetic work done by Mr. Cuyler Adams about the year 1895. Very little was done, other than magnetic research work, until the year 1904 when the first drilling was started in Sec. 16, Town 46, Range 28, about a mile southeast of Deerwood.

¶ The first shipment of ore from the Cuyuna Range was made in 1911 from the Kennedy mine.

¶ Minnesota furnishes yearly about three-fifths of the iron ore produced in the United States; the shipments during 1910 amounting to 30,404,937 tons, and for 1911, 23,182,462 tons.

TOTAL IRON ORE PRODUCED TO JAN. 1, 1912.

Lake Superior District			525,903,712 tons.
Minnesota	Missabe Range	247,019,916 tons	
	Vermilion "	31,417,492 tons	
	Cuyuna "	147,431 tons	—278,584,839 tons.

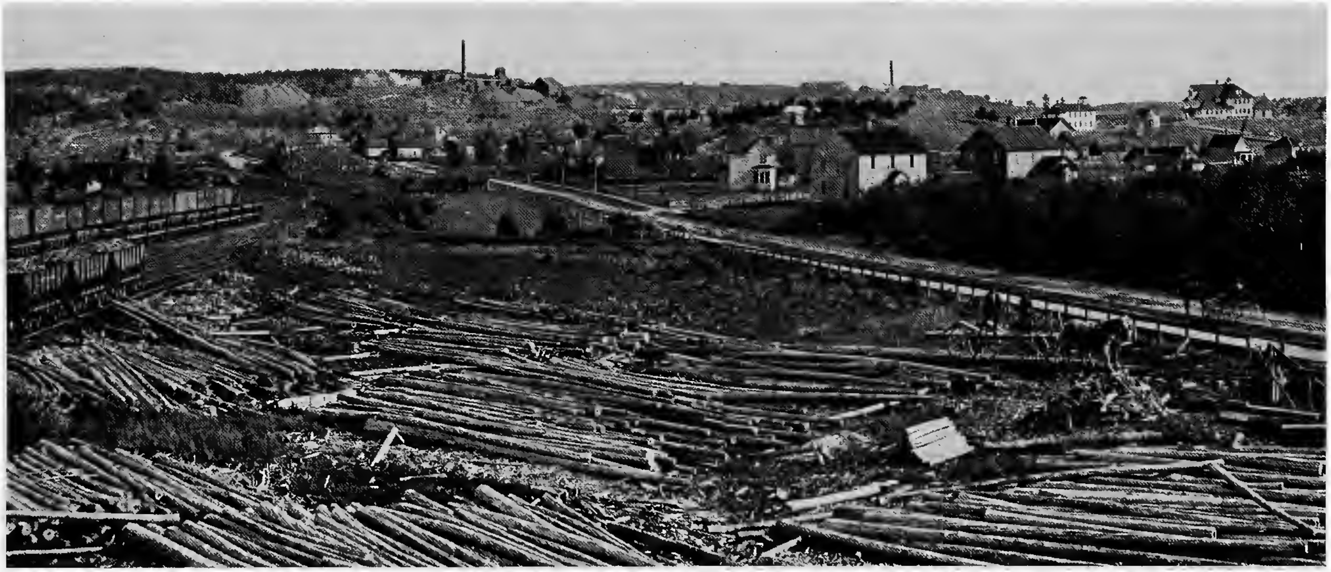
VERMILION RANGE

THE VERMILION range extends from the vicinity of Tower to and beyond the international boundary, crossing into Canada at the eastern end of Hunter's Island. Merchantable bodies of ore have been discovered at but two localities along this extent, one at Tower and the other near Ely.

¶ The iron bearing formation of this range occupies the lowest position geologically of any of the Lake Superior iron formations, being designated by Van Hise and Clements as in the Archean.

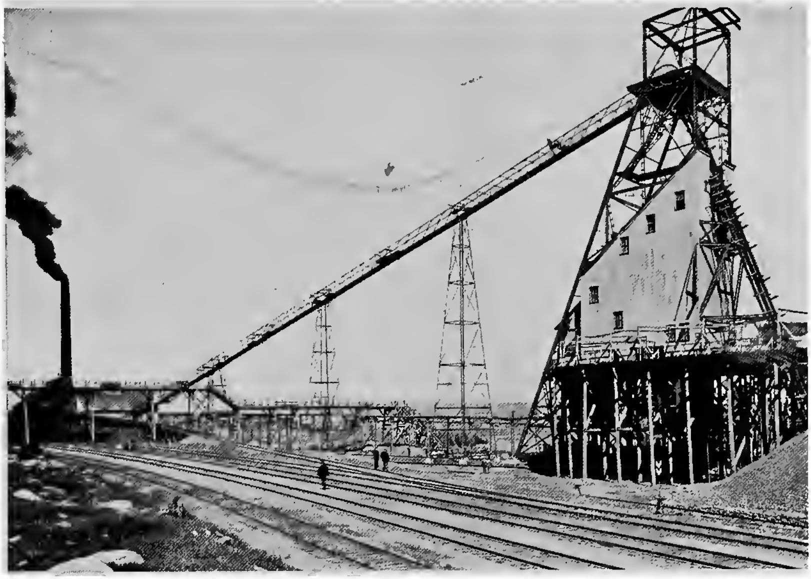
¶ At the Minnesota mine the ore is a dense hard hematite occuring in irregular connected and disconnected lense shaped bodies in the jasper, which is intricately infolded in the spheroidal greenstone or green schists, so-called on account of a characteristic spheroidal parting. The strike is about east and west and the dip approximately vertical with a westerly pitch. The underground workings at this mine are some 4,500 feet in extent east and west, and over 1,500 feet in depth. The structure here is probably the most complex in the Lake Superior iron districts. Above the iron bearing formation, geologically, comes the basal conglomerate of the Lower Huronian, carrying large boulders and masses of the iron bearing rocks.

¶ The ores at Ely differ from the preceeding, mainly in their physical structure, being much more broken and friable. The area in which they lie is a double ended trough about two miles in length east and west and some 1,500 feet in width. The general dip is nearly vertical and the pitch of the ore bodies at the west end of the trough, is to the east, while the pitch of those at the east end is to the west. The iron formation here, as at the Minnesota mine, lies in a trough of the older spheroidal greenstone, but the folding is not so close. Intrusive masses and dikes of granitic porphyry and basic eruptives cut the whole series.



Soudan Mine near Tower—Where iron ore was first mined in Minnesota

Long Lake near Ely, Minnesota



A Shaft, Pioneer Mine, Ely, Minnesota

A Shaft, Pioneer Mine, Ely, Minnesota

MISSABE RANGE

THE Missabe range extends continuously from near Grand Rapids on the Mississippi river E. N. E. for a distance of about 90 miles to near Birch Lake, where it is covered by the large gabbro flow which forms the base of the Keweenawan series. The same formation (Missabe) appears again near Gunflint Lake on the international boundary and shows as far east as Thunder bay on the north shore of Lake Superior. Between the Missabe station, on the D. & I. R. R. R., and Birch Lake the formation consists of alternate thin layers of chert and magnetic ore, but although considerable exploration work has been done, there is no evidence of concentration of ore in workable bodies in this area with the exception of one or two small deposits just East and close to the railroad. The Gunflint beds are thin alternating layers of chert and hematite. All the workable deposits, at present known on the Missabe lie between Missabe Station and Grand Rapids, the greater number being in St. Louis County.

¶ The great bulk of the iron formation is ferruginous chert more or less amphibolitic, calcareous or sideritic and gray, red, yellow, brown or green with bands or shoots of iron ore. It is analagous to the jaspers of the other iron ranges. A few thin beds of slate occur in the formation.

¶ The north edge of the range was easily determined as exposures of the older rocks are fairly numerous; the south edge, or more properly the north edge of the overlying black slates, was determined by drill work entirely, as there are no exposures of this slate. The iron formation is flat-lying with a slight average dip to the south, although local high dips occur. In this respect it differs from all other districts in the Lake Superior region.

¶ It may be said that the ore bodies in general lie with their longer axes in the direction of the trend of the formation, although they are irregular in outline. The transition between the rich ore and the taconite is usually very abrupt, and the original bedding can be plainly distinguished running through the ore. One body of ore is known to have a continuous extension of over 4½ miles and an average width of about ½ mile and to be several hundred feet thick in places. These flat-lying ore bodies vary in thickness from a few feet to around 500 feet, and a large majority occur just beneath the drift, although some have a jasper capping. The surface or overburden varies from practically nothing to some 200 feet, perhaps an average would lie between 60 and 80 feet.

¶ The ores of the Missabe are red, brown and yellow hematites and limonites, more or less hydrated, and are secondary replacements or enrichments of the jasper. They are supposed to be mainly derived from the silicates of iron, which are abundant in the rocks of the iron formation, and to a less degree from siderite. In physical structure they vary from a fairly compact phase to earthy or powdery phases, and are comparatively high in moisture. At the west end of the range the ores are more or less "sandy," a condition evidently resulting from the decomposition of the cherty layers in the banded iron and chert.

¶ The first ore from the Missabe range was shipped from the Mountain Iron mine over the Duluth, Missabe & Northern Railroad in 1892. The total shipments during that year amounted to 4,248 tons. Since that time the Mountain Iron mine has produced 17,200,000 tons.

IRON ORE PRODUCTION.

1910 - - - - - -	29,201,760 tons
1911 - - - -	22,093,532 "
Total to January 1, 1912 - -	247,019,916 "

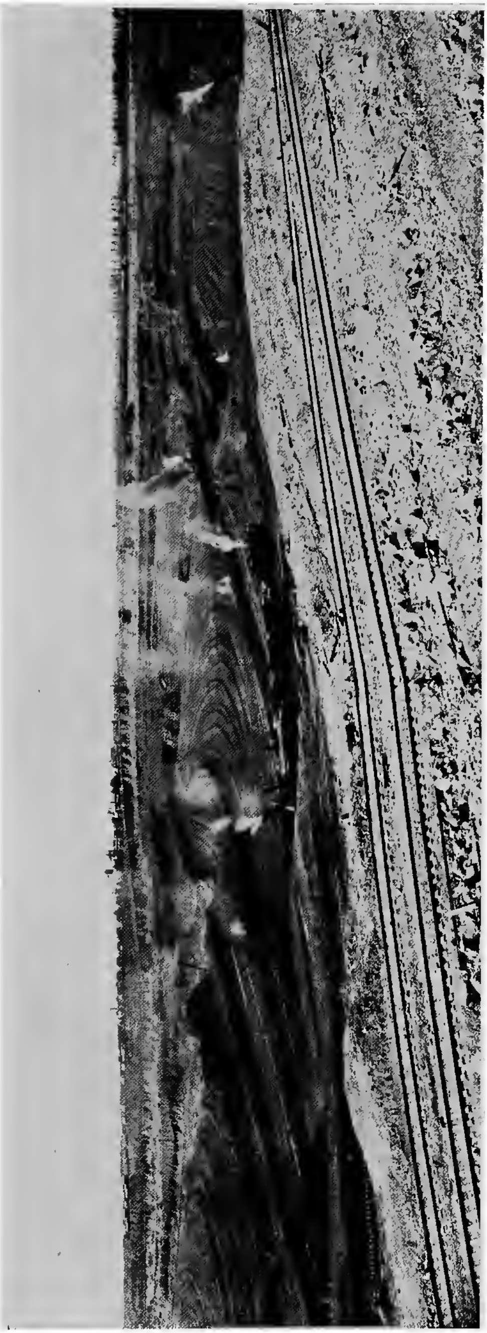
¶ Since the Missabe range opened there has been removed 180,574,000 cubic yards of stripping. Last year the Oliver Iron Mining Company handled 16,341,730 cubic yards; other companies about 7,000,000 cubic yards.

¶ The total excavation for the Missabe Range, taking into account ore and stripping to Jan. 1, 1912, is as follows:

1892 to 1900 stripping -	22,089,000 cu. yds.
1901 to 1912 " -	158,485,000 " "
1892 to 1912 ore -	123,510,000 " "
Grand Total -	304,084,000 " "

¶ The total excavation for the Panama Canal is, according to the latest figures, 195,323,379 cubic yards.

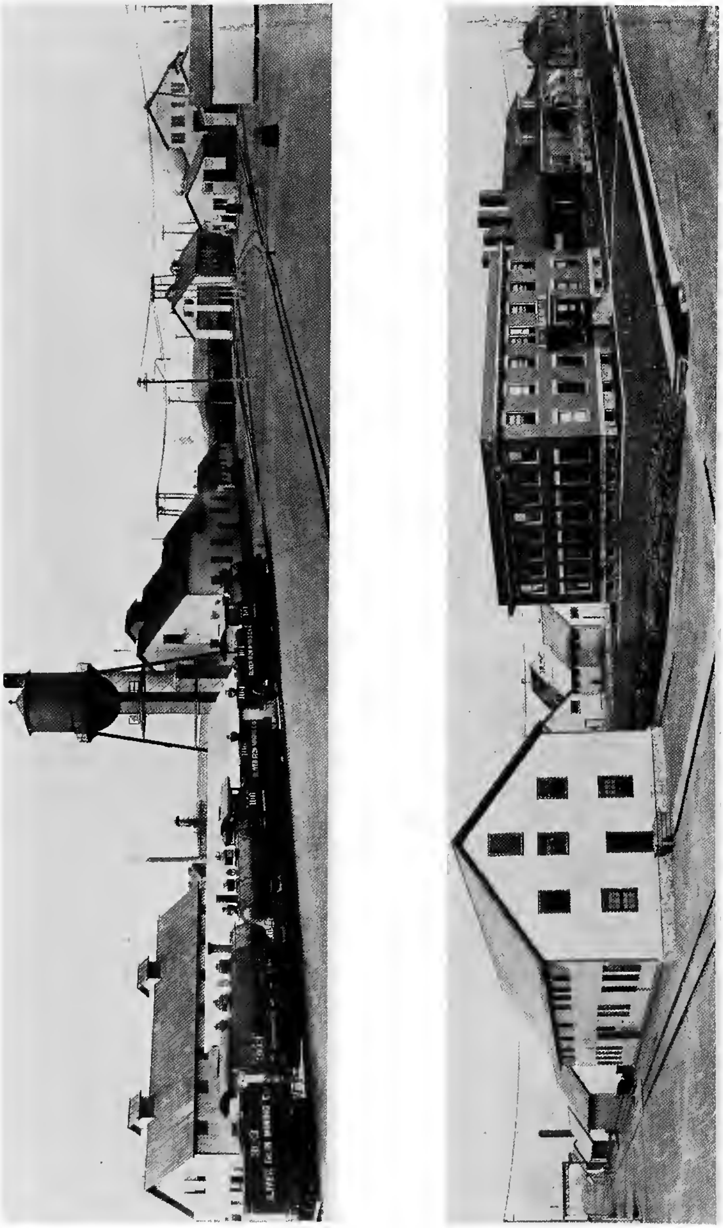
Fayal Mine, Eveleth, Minnesota—Total Shipments, 20,052,013 tons



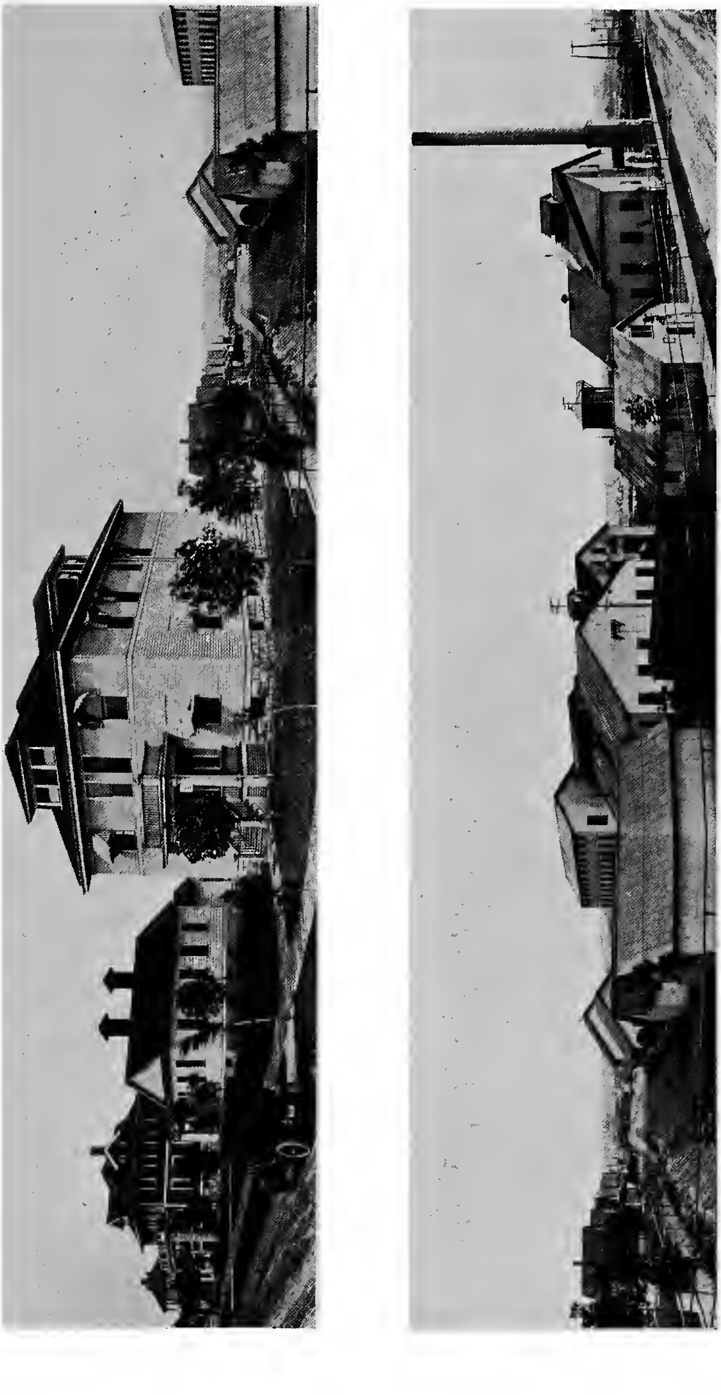
Hull-Rust Mine, Hibbing, Minnesota—Total Shipments, 18,726,123 tons

Mountain Iron Mine, Mountain Iron, Minnesota—The first shipper of the Missabe Range. Total Shipments, 17,198,871 tons.

Mahoning Mine, Hibbing, Minnesota—Total shipments 15,058,800 tons



Headquarters Oliver Iron Mining Company, Hibbing, Minnesota—Showing Shops, Office, and Laboratory

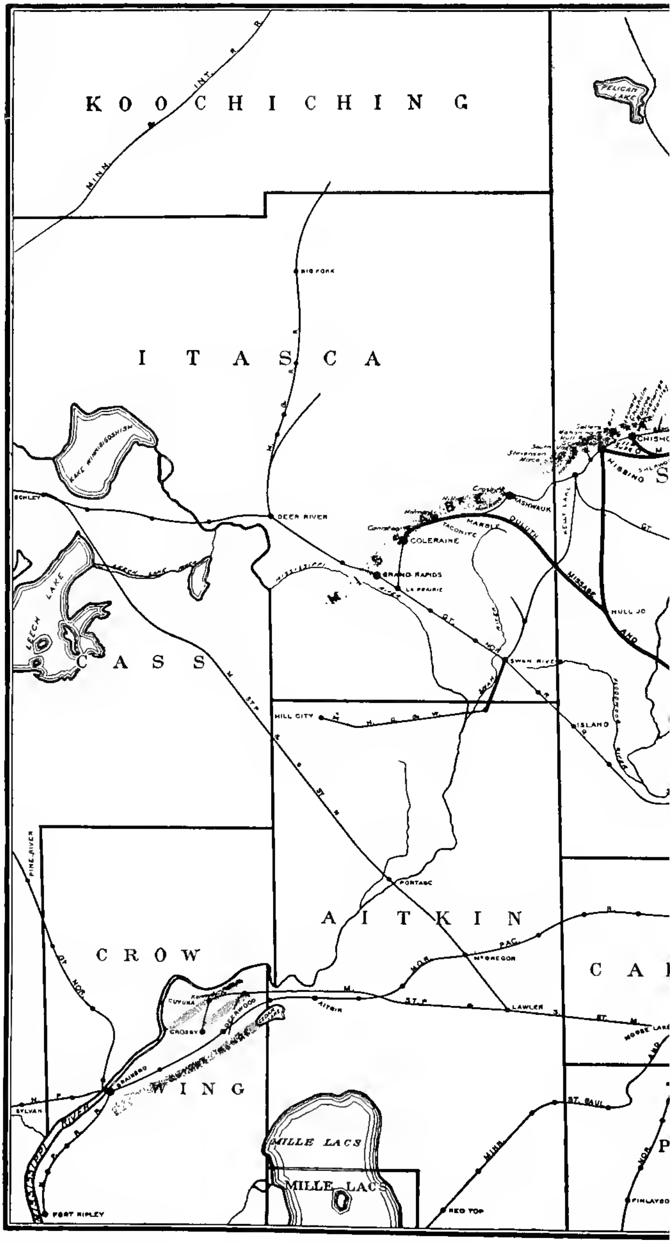


Headquarters Oliver Iron Mining Company, Virginia, Minnesota—Showing Club House, Laboratory, Office, and Shop Buildings

No. 4 Shaft, Spruce Mine, Eveleth, Minnesota

FIFTY PER CENT of the high grade ore of the Missabe will have to be mined by underground methods. On account of the deep overburden in many places it is not practicable to strip a property; also, for the reason that a good portion of the ore bodies are thin and cannot be mined by steam shovel, it is necessary to sink shafts and carefully remove the ore by underground means in order that the material be not lost and wasted. Then, again, owing in many cases to the overburden of quicksand, made wet and treacherous by the accumulation of water, it is necessary to sink concrete shafts in order to get to the ore below.

Mine Location—Monroe Mine, Chisholm, Minnesota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MINN. INT. R.R.
PELICAN LAKE
BIG FORK
ITASCA
M. & R.R.
LAKE WINNIBIGOSHISH
SCHLEY
DEER RIVER
LEECH LAKE RIVER
LEECH LAKE
CASS
MISSISSIPPI RIVER
GRAND RAPIDS
LA PRAIRIE
COLERAINE
TACONITE
MARBLE
NASHWAUK
KELLY LAKE
CHISHO
HIBBING
DULUTH MISSABE AND
HULL JC
GT. NOR.
SWAN RIVER
ISLAND
HILL CITY
M. N. & S. W.
M. STP. & S.S.M.
PORTAGE
AITKIN
NOR. PAC.
McGREGOR
LAWLER
ST. P.
MOOSE LAKE
ST. M.
CA
CROW WING
GT. NOR.
PINE RIVER
CUYUNA
CROSBY
DEERWOOD
CEDAR LAKE
BRAINERD
N. P.
SYLVAN
MISSISSIPPI RIVER
FORT RIPLEY
MILLE LACS
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RED TOP
ST. PAUL
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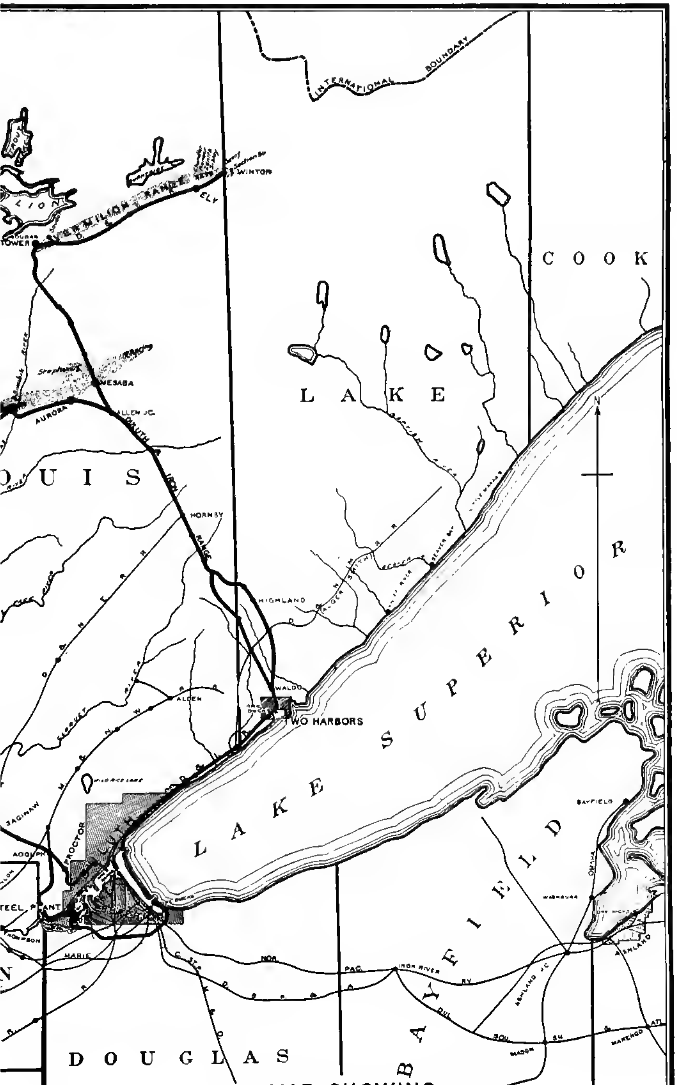
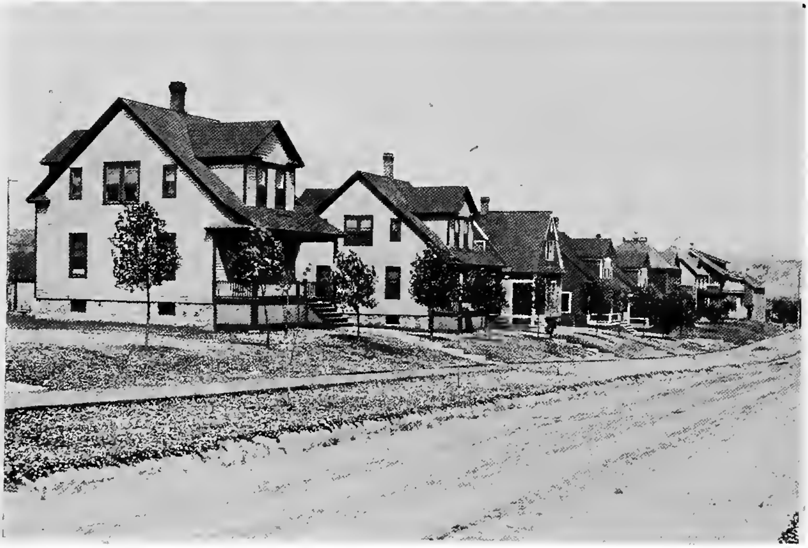
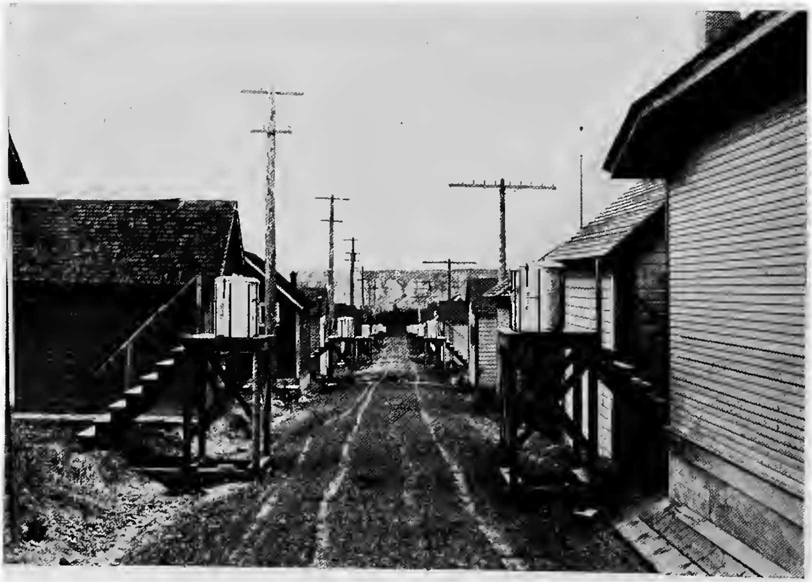


MAP SHOWING
IRON RANGES OF MINNESOTA
WITH
RAILROADS AND SHIPPING POINTS
TRIBUTARY TO SAME

LEGEND
U.S. STEEL CORP. R.R. OTHER TRUNK LINES



Mine Location—Virginia, Minnesota



A Type of Sanitary Alley, Mine Location—Virginia, Minnesota

Views of Coleraine, Minnesota

Concentrating Plant, Coleraine, Minnesota

¶ A large portion of the ore on the Western Missabe Range occurs mixed with sand, making it necessary to build washing plants to remove the worthless material and bring the ore to a merchantable grade.

¶ The Concentrating Plant at Coleraine consists of five units, each unit comprising the following:

1 Receiving bin,
1–20 ft. revolving screen, 2 in. holes,
1 Picking belt,
2–25 ft. log washers,
2–18 ft. "turbo" washers,
20 Overstrom tables,
1 Shipping pocket,
Necessary settling tanks, rock bins, sand pumps and driving mechanism.

¶ Each unit is operated by a 100 h. p. motor. The capacity of each unit is 4,000 tons of crude ore per day, or a total of 20,000 tons per day.

¶ All structural work was furnished and erected by The American Bridge Co.

¶ In the mill, trestle and tail track, there are 6,400 tons of steel.

¶ The Power Plant comprises the following:

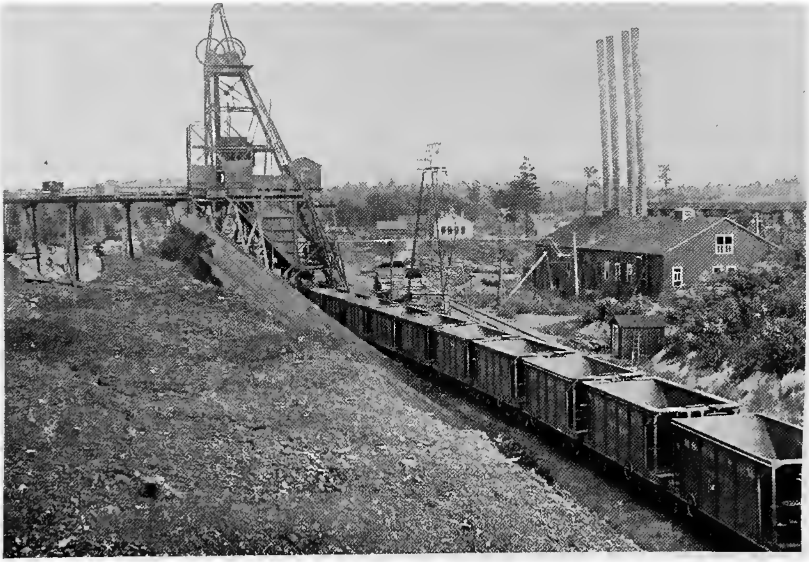
6–72 in.x18 ft. H. T. boilers with tile stack.
1–26x52 and 16x48 Prescott, Cross Compound, Condensing Pumping-engine; capacity 12,000,000 gallons, delivering through a 30 in. steel main to mill,
1–26 and 52x48 Cross Compound, Condensing, Corliss engine, direct connected to 1250 K. V. A., 6,600 volt, 60 cycle generator.
The necessary exciter sets, (switchboard, transformers, etc.)

CUYUNA RANGE

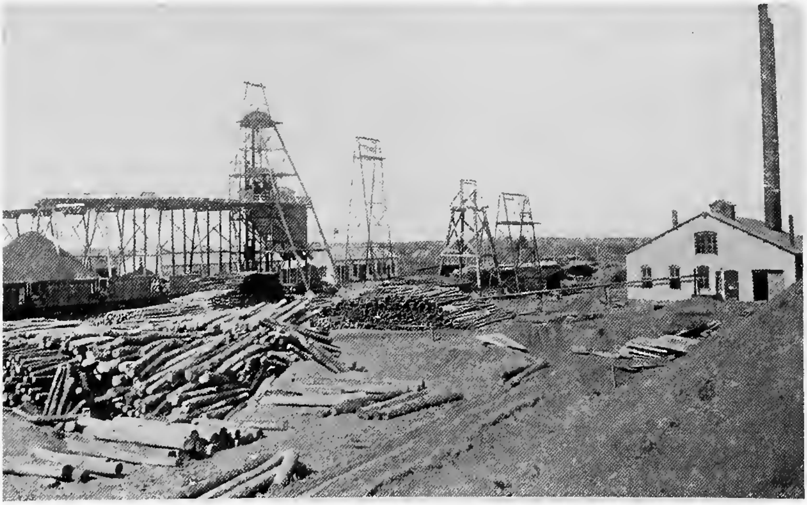
¶ The Cuyuna Range lies in the vicinity of Deerwood, 100 miles west of Duluth.

¶ The occurrence of the ore deposits on the Cuyuna Range differs greatly from that of the Missabe. The Cuyuna, in a broad sense, occurs as a series of detached lenses or bodies of iron bearing material, in connection with the great slate area which abounds throughout this section of the State. Within these lenses of iron bearing rocks, the ore deposits are found. The ore bodies dip steeply from the horizontal, conforming to the dip of the slates, their long dimensions being about parallel and lying in a northeast and southwest direction. The south range consists of a long, narrow belt, containing a series of iron formation lenses, lying close together, parallel and overlapping. The deposits on the north range are more scattered and cover a larger area.

¶ The Kennedy is the pioneer mine of this range. This property is being worked by the Rogers Brown Company. Shipments began in the year 1911 and to Jan. 1, 1912, amounted to 147,431 tons. Several other properties have since been opened.



Kennedy Mine, Cuyuna Range



Armour Mine, No. 1, Cuyuna Range

RAILROADS

DULUTH & IRON RANGE RAILROAD.

¶ The Duluth & Iron Range Railroad was built from Two Harbors to the Vermilion Range at Tower, a distance of 67.6 miles, in 1884, and extended to Ely, 21 miles east of Tower, in 1888. It was built into Duluth in 1886, and branches were extended from its main line to the Missabe mines in 1892 and 1893.

DULUTH, MISSABE & NORTHERN RAILWAY.

¶ The Duluth, Missabe & Northern Railway was constructed from Stony Brook to Mountain Iron, a distance of 48 miles, in 1892. The Biwabik branch from Iron Junction to Biwabik, a distance of 15 miles, was constructed in 1892. The Superior branch from Wolf to Hibbing, a distance of 16 miles, was constructed in 1893. The Duluth extension from Columbia Junction to Duluth, a distance of 29 miles, was completed in 1893. The Alborn branch from Coleraine Junction to Coleraine, a distance of 53 miles, was constructed in 1906.

GREAT NORTHERN RAILWAY LINE.

Missabe Division.

¶ The Great Northern Railway Line acquired what is now its Missabe Division, over which line ore is transported from Missabe Range mines to docks at Allouez, Wisconsin, by purchase of the Duluth, Superior and Western Railway (Duluth and Winnipeg) in 1898. At time of purchase this line extended from Duluth to Deer River, connecting with the Duluth, Mississippi River and Northern Railway at Swan River, this latter road extending to the mines. In 1898 the purchase of the Duluth and Mississippi River and Northern Road was affected, which gave the Great Northern a line through to Barclay Junction, (now Chisholm), Minnesota. In 1900 and 1901 extension was built from Barclay Junction to Virginia, and in 1901 and 1902 line was built from Ellis (near Virginia) to a point on the old D. S. & W., at Brookston. In 1902 and 1903 what is now designated as the "South Range Line" was constructed from Hibbing to Virginia. There has also been built a "cut-off" known as the Kelly Lake Fermoy Line.

¶ All the roads mentioned above transport ore from the Missabe Range. The Duluth & Iron Range handles the ore from the Vermilion District.

¶ The following shows the general equipment of the ore carrying roads necessary for the handling of the enormous yearly tonnage from the Missabe and Vermilion Ranges:

Road	Mileage	No. of Engines	No. of Cars
Duluth & Iron Range	200	104	5627
Duluth, Missabe & Northern	328	110	7789
Great Northern (Missabe Division.)	310	75	6876

¶ The branch line of the Canadian Northern Railroad between Fort Frances and Duluth will be finished some time during the present year. This road passes through Virginia and no doubt later will also carry ore from the Missabe Range.

¶ In the summer of 1910 the Soo Line finished a branch road to the Kennedy mine. This, together with the Northern Pacific, gives the Cuyuna District two railroads. At present the ore from this newly-found range is being handled by the Soo Line through their new dock at Superior.

Right-of-way on the Duluth & Iron Range Railroad

This right-of-way is conceded by State Foresters to be in ideal condition and an example for all railroads in similar districts

Section of D. M. & N. Ry. Main Line, showing double track, 100-lbs. to the yard rail, steel ties and rock ballast

50 miles of track for the storage of ore - Proctor, Minnesota, D. M. & N. Ry.

ORE DOCKS

Duluth & Iron Range Ore Docks at Two Harbors.

Dock No.	Length Ft.	Width		Working, Storage Capacity Tons
		Ft.	In.	
1 (Steel)	1376	51	8	5,200
2	1280	49		31,200
3	1054	49		25,500
4	1042	49		25,200
5	1050	49		25,200
6 (Steel)	920	51	3¼	37,000
		Total Tons	-	196,100

Duluth, Missabe & Northern Ore Docks at Duluth.

Dock No.	Length Ft.	Width Ft.		Working, Storage Capacity Tons
2	2336	49		38,400
3	2304	59		57,600
4	2304	57		76,800
		Total Tons	-	172,800

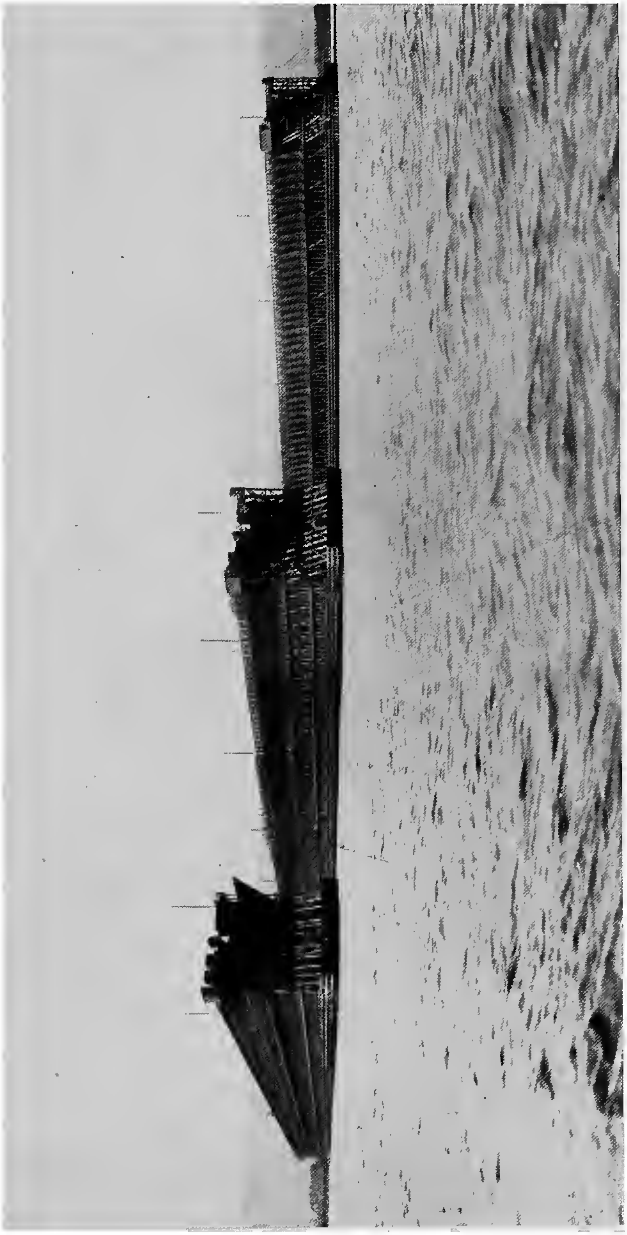
Great Northern Ore Docks at Superior, Wis.

Dock No.	Length Ft.	Width		Working, Storage Capacity Tons
		Ft.	In.	
1	2244	62	8	112,200
2	2100	62	8	105,000
3	1956	62	8	97,800
4 (Steel)	1812	62	6	105,700
		Total Tons	-	420,700

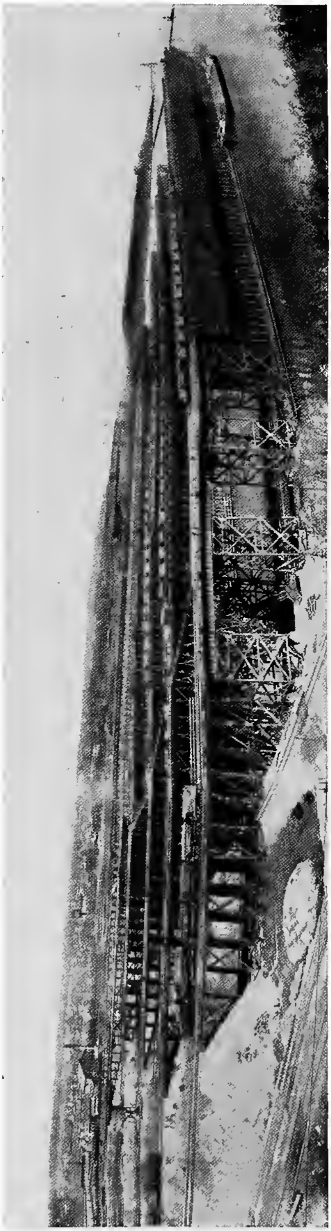
Minneapolis, St. Paul & Sault Ste. Marie Ry., at Superior, Wis.

Dock No.	Length Ft.	Width Ft.	Working, Storage Capacity Tons
1	1200	58	60,000

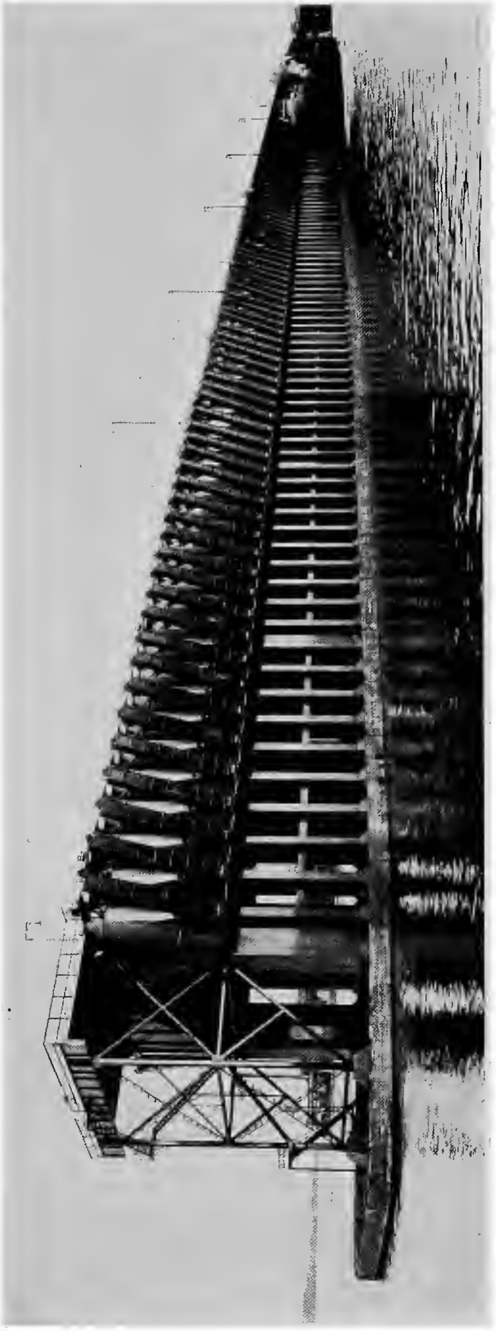
During 1911, about 6,934,000 tons of ore was handled by the Duluth, Missabe & Northern Railway from the West Duluth docks; 6,367,000 tons by the Duluth & Iron Range at Two Harbors; 9,920,000 tons by the Great Northern at Superior, and 147,000 tons by the Soo Line.



D, M. & N. Ry. Ore Docks, Duluth, Minnesota



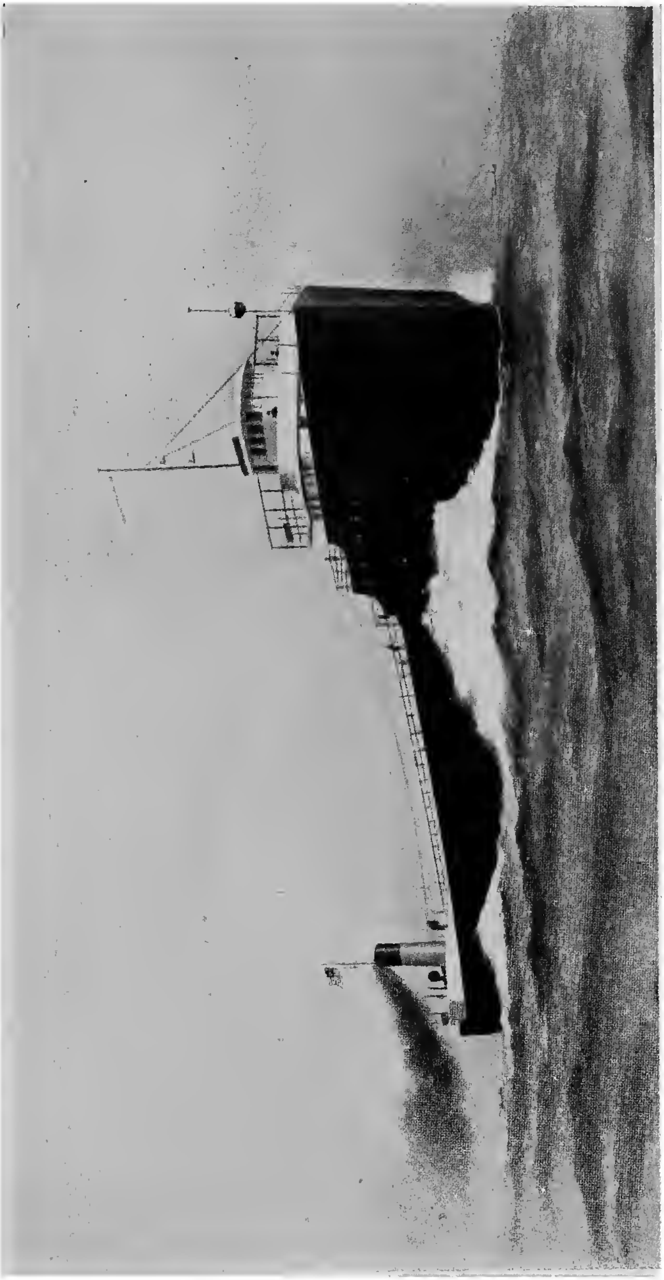
Duluth & Iron Range R. R. Ore Docks—Two Harbors, Minnesota



One of the Great Northern Ry. Ore Docks—Superior, Wisconsin

Loading Boat at Ore Docks

Fire Tug, W. A. McGonagle



Type of Ore Carrier on Great Lakes—Boats ply the Great Lakes carrying iron ore, grain and coal

LAKE TRANSPORTATION

ONE of the first ships of commerce to arrive in the harbor of Duluth was the Meteor, in September, 1868. The capacity of this boat was about 500 tons. The first cargo of ore shipped from Minnesota was carried by the steamer Hecla. This ore was loaded on August 19, 1884, at Two Harbors at the Duluth & Iron Range dock and consisted of 1427 tons.

¶ At the present time there are about 400 boats used for the ore carrying trade. The capacity of this fleet is estimated around 55,000,000 tons of ore a season. This is in addition to the transportation of coal and grain.

¶ The Pittsburgh Steamship Company owns 105 boats.

¶ Ore is being carried on the Great Lakes over an average distance of 1,000 miles for as low as 50 cents a ton, the boat owners paying the unloading charge of 10 cents a ton.

¶ The following will give an idea of the size of the newer boats constituting a part of the ore carrying fleet:

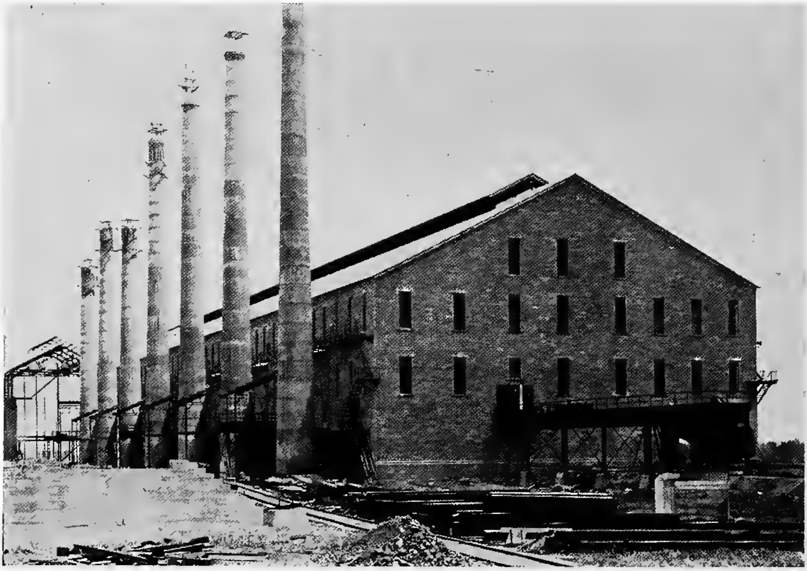
STEAMER	Length Feet	Width Feet	Tonnage Gross Tons
Col. J. N. Schoonmaker	617	64	14,000
W. P. Snyder, Jr.	617	64	14,000
Thomas F. Cole	605	58	12,000
L. S. DeGraff	605	60	12,900
W. B. Kerr	605	60	12,300

¶ The usual time of loading an ordinary size boat of about 10,000 tons is six hours. The steamer Corey was loaded at Superior, September 8, 1911, with 9,456 gross tons of ore in twenty-five minutes (actual time loading). The steamer W. P. Palmer unloaded 11,000 tons of ore at Conneaut in two hours and fifty-eight minutes.

Minnesota Steel Company Shop Buildings

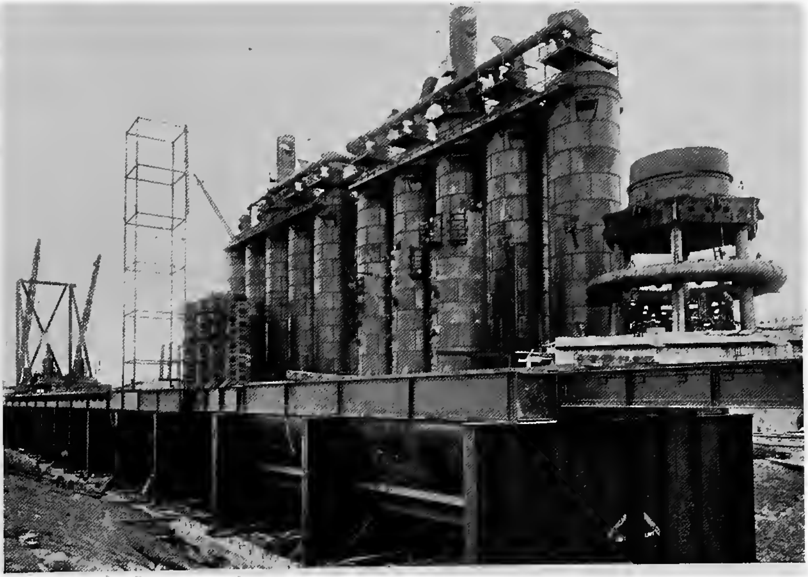
¶ The plant of the Minnesota Steel Company is located on the St. Louis River, nine miles from Union Depot at Duluth, on a tract of 1500 acres, with two miles of water front and connected by the Spirit Lake Transfer Ry. and Interstate Railroad, with all railroads entering Duluth or Superior. The present plans include:

Two blast furnaces—500 tons daily capacity each; thin lined, water cooled shells; 10 stoves, gas washers, etc.
Ninety Koppers type by-product coke stoves.
Seven open hearth furnaces—rated capacity 75 tons each. (Each furnace equipped with 400 h. p. boiler for utilizing waste heat.)
Four 4-hole soaking pits.
One 40-in. reversing Blooming Mill, steam driven, with low pressure turbine generator set.
One 28-in. finishing mill—Motor driven
One 16-in. continuous roughing train with
  3 Stand 12-in. finishing
  2 Stand 10-in. finishing
  2 Stand 8-in. finishing
} Motor driven
Power house—10,000 K W capacity
Blowing engine—4 gas driven 40,000 cu. ft. capacity
Pumping station—30,000,000 gallons daily capacity
Machine Forge and Structural Shop.
Two continuous reheating furnaces—regenerating type, end discharge, designed to use 16-foot billets. Estimated daily capacity of 1,000 tons ingots.
All buildings steel frames, enclosed with two-piece concrete blocks.



Open Hearth Plant

Merchant Mill



Hot Blast Stoves

Inter-State Transfer Bridge—Minnesota Steel Co., New Duluth, Minnesota

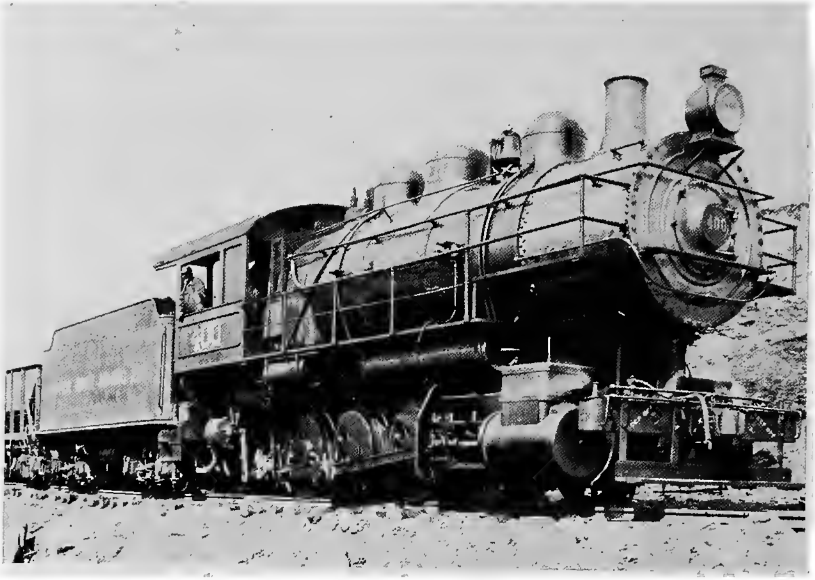
SAFETY APPLIANCES

ONE of the most important developments in connection with the operation of large industries is that pertaining to the safety and protection of the workmen, and the practical application of approved safety devices to all classes of machinery in the mines, shops and railroads.

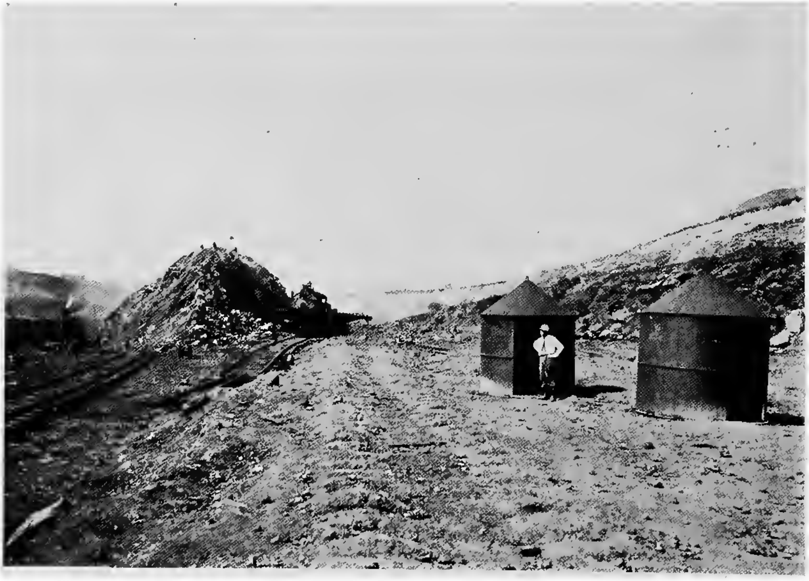
¶ Since the organization in March, 1908, of the Safety Committee of the United States Steel Corporation, much good work has been done in the cause of safety, one of the features of which has been the arousing of an intelligent interest among the employees themselves.

¶ In all machine shops, platforms 3 feet or more above the ground are guarded with hand-rails and toe-boards, all gearing is covered and belts are protected up to 5 feet from the floor. In fact, protection devices are applied to all machinery where any element of danger exists.

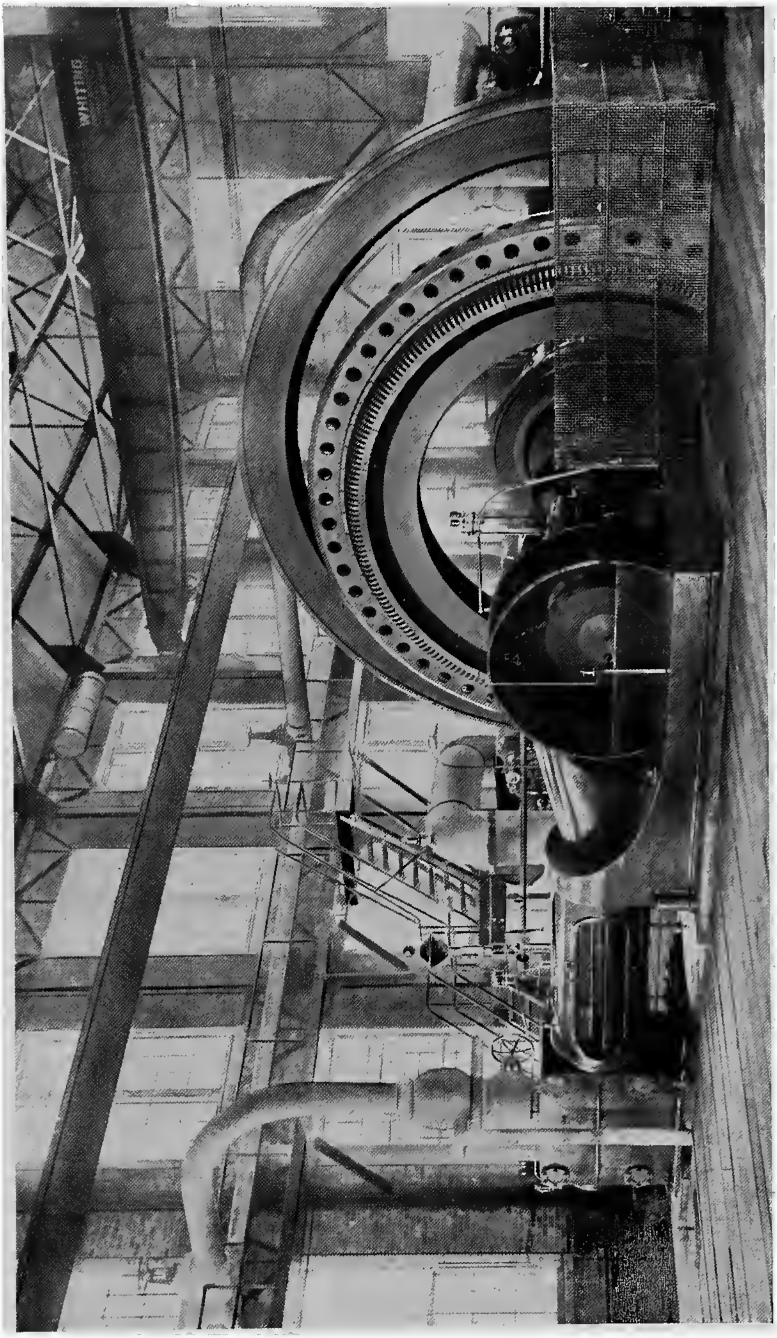
¶ In 1911 there was expended in this distict by the United States Steel Corporation, in safety work, the sum of $148,000; during 1912, to July 31st, the expenditure was $40,000.



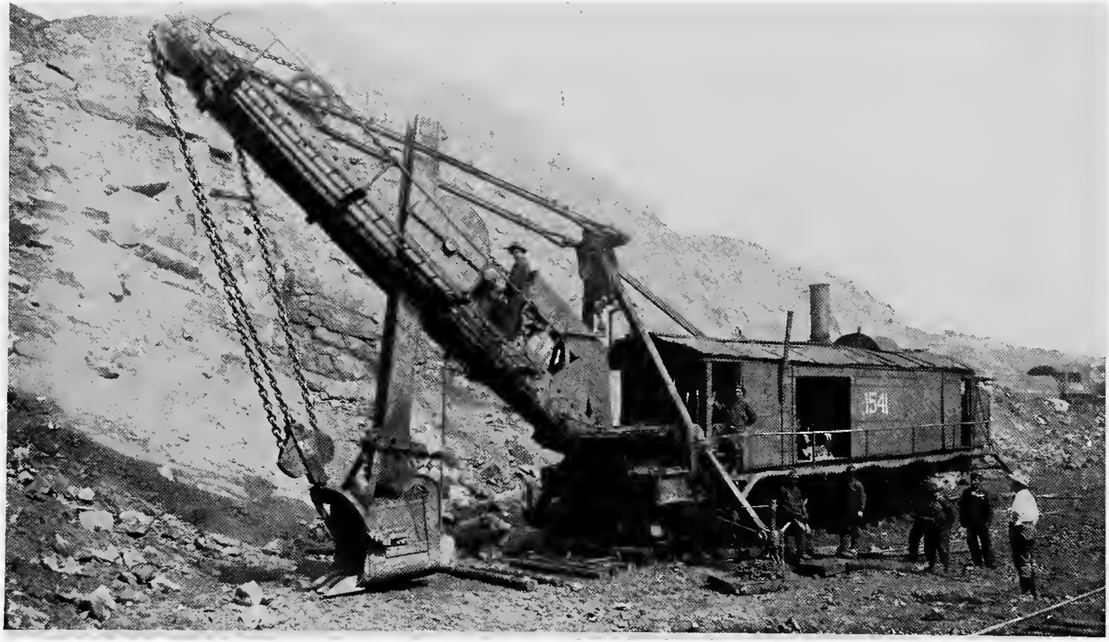
Type of Engine used at the Oliver Iron Mining Company's Mines. Note the guard railings for protection of men.



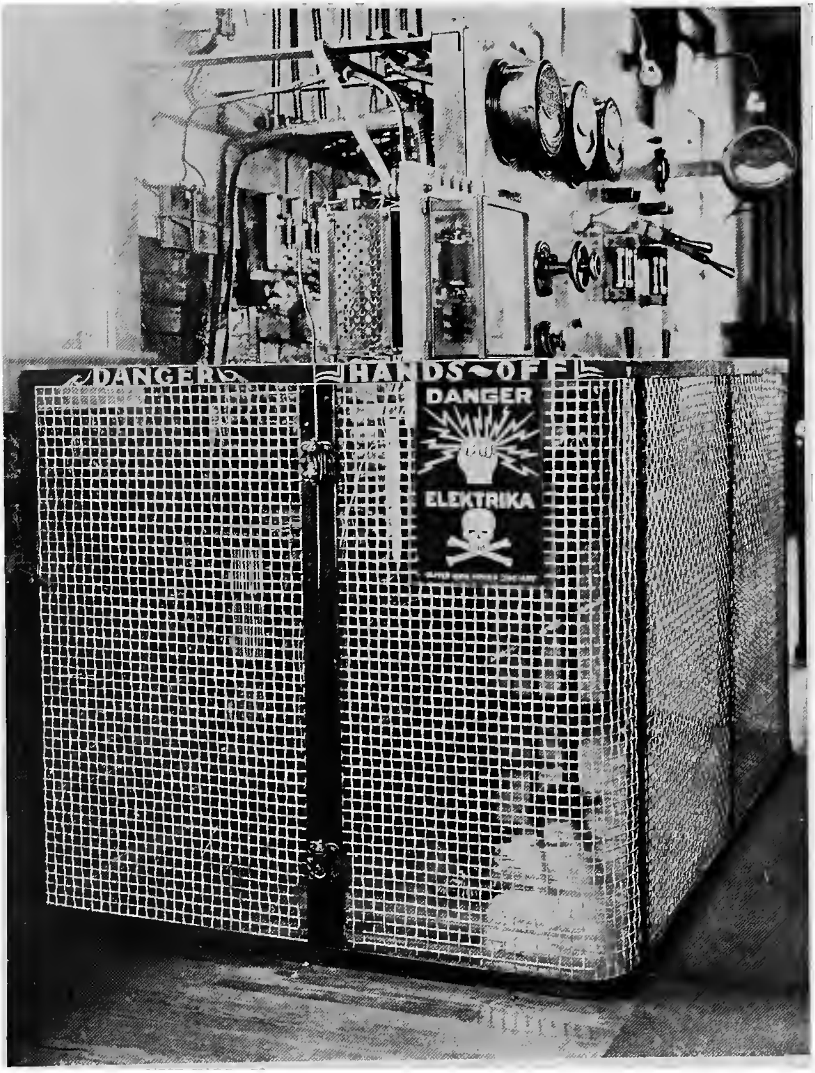
Safety Houses—Men use these to protect themselves from flying material hurled by blasting in the pits.



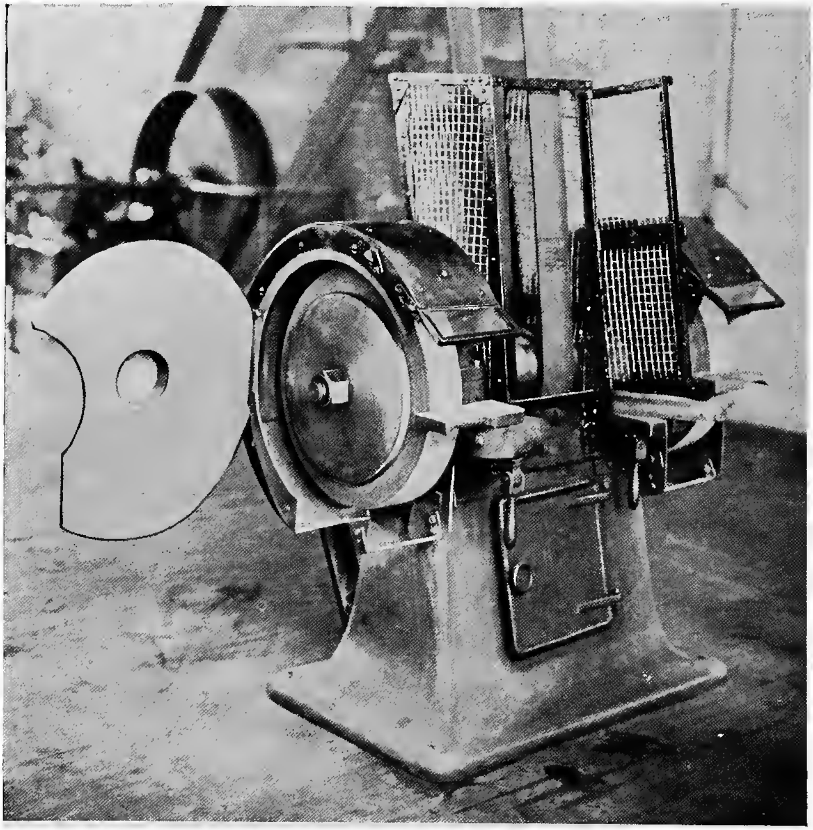
Power House at Trout Lake, Coleraine, Minnesota
Note the method of guarding by means of hand rails and gratings



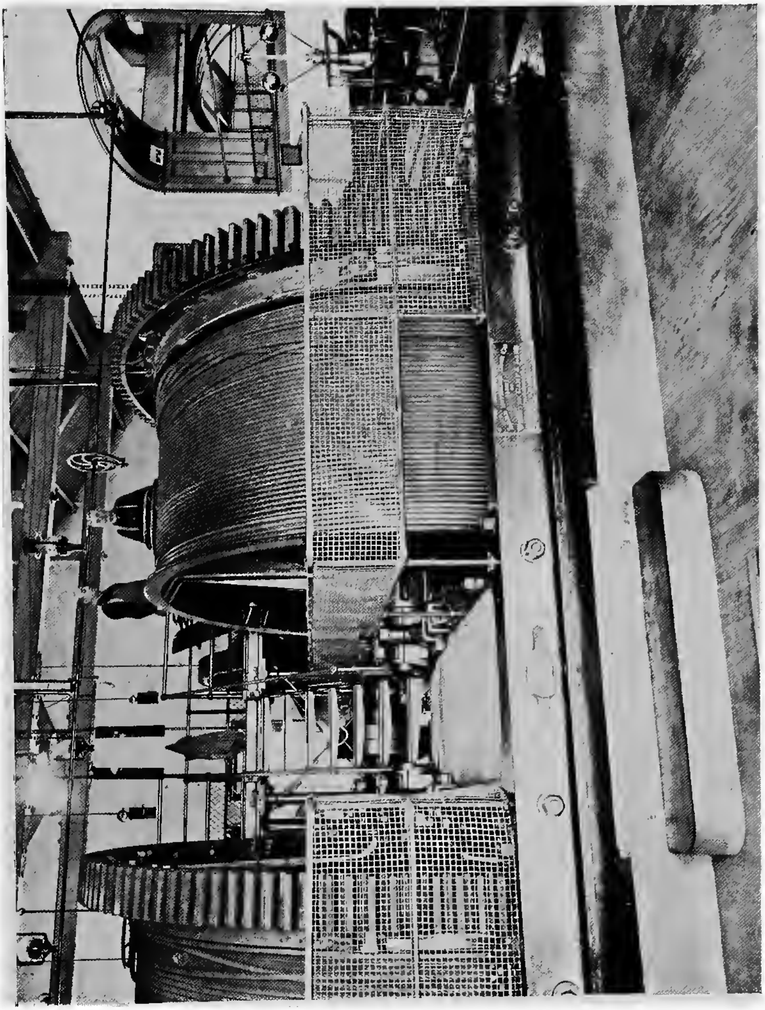
Type of Steam Shovel used by the Oliver Iron Mining Company
Note the complete covering of the gear wheels for safe-guarding the men



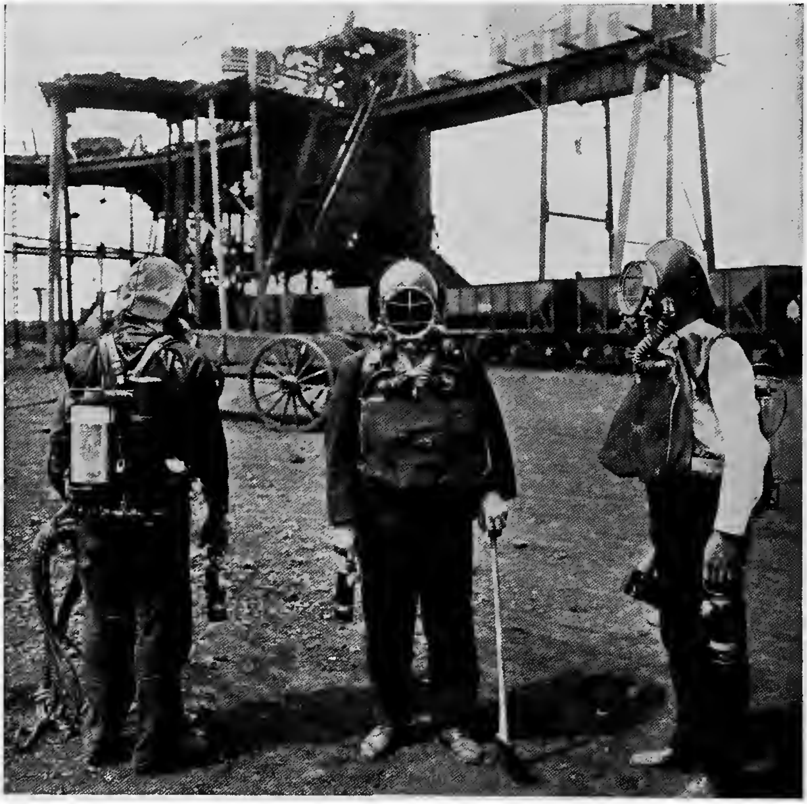
Type of Switchboard in the Power Plants of the Oliver Iron Mining Company



Emery Wheel—Showing method of safe-guarding



Mine Hoist—Two men are always stationed on the platform when men are being hoisted or lowered



Draeger Oxygen Apparatus—Used in case of fire or bad air to extricate men from dangerous places

THE annual consumption of timber used by the Oliver Iron Mining Company is approximately 25,000,000 feet board measure of mining timber, and 30,000 cords of lagging. To insure these requirements it has to have extensive standing timber reserves. A department of Timber lands, maintained by this company, employs a large number of men, especially during the winter seasons when the logging operations are carried on.

* * *

Oliver Iron Mining Company Logging Camps on Bass Lake, showing Mess Camp, Sleeping Camp, Blacksmith Shop, Office and Stables

Loading assorted mining timber logs on cars for shipment to the mines

Logging crew eating dinner in the open on the works

Mining timber logs being stored in the east arm of Burntside Lake

Driving mining timber logs down the Cloquet River

Land and Colonization Work *of* *The* Duluth & Iron Range Railroad Company

THE Duluth and Iron Range Railroad Company received from the State of Minnesota a Swamp Land Grant of 606,720 acres to aid in the construction of its railroad. Taxes on these lands are covered by the gross earnings tax of the railroad. However, on September 1st, 1910, the management of the Duluth & Iron Range Railroad Company voluntarily placed these lands upon the tax list, thereby aiding in helping develop the country, build up its schools, and otherwise support the districts in which considerable lands, including State lands, which did not pay taxes, are located.

¶ Ten years ago a policy of colonization was adopted and sales of lands to speculative holders discouraged as far as possible. Land sales were made only to actual settlers and in amounts, so far as possible, of forty and eighty acres, thereby encouraging the small farmer and making more rapid and certain development. So far as is possible the settler is placed only in districts where wagon roads have already been built. The Land Department spends for the construction of wagon roads about $10,000 annually.

¶ In order to eliminate as far as possible the pioneer work of the settler, a demonstration farm was established, which is now operated under the supervision of an expert agriculturist who supervises and acts as agricultural advisor to all settlers in Duluth & Iron Range territory. He also organizes Farmers' Clubs, Poultry Associations and various co-operative institutions and helps in marketing problems. At Meadowlands Colony, where the demonstration farm is located, some six hundred acres have been cleared and plowed and are being sold in ten and twenty acre tracts to small farmers for truck raising, fruit growing and poultry farming. These are proving successful and this work will be continued.

¶ At this point some nine years ago the entire settlement consisted of less than a dozen people. Today the settlement has over six hundred people and is opening up this school year, September, 1912, a fine four room graded agricultural consolidated school with additional class rooms for agricultural, domestic science, and manual training courses. The school is steam heated, has fan ventilation, open plumbing with sanitary drinking fountains and has ten acres of land cleared and prepared for agricultural and various other kinds of work. This land cleared and ready for use was donated by the Land Department.

School House at Meadowlands

Hay Field at Meadowlands

¶ The Department has purchased the most up to date machinery for developing the country, including a traction engine for operating road graders, and the most up to date deep tilling plows.

¶ Original investigation and demonstration work is being carried on in connection with peat and muck lands under the supervision of the Dean of the Agricultural Department of the University of Minnesota.

¶ It is the intention of this Department to make the administration of its Land Grant a benefit not only locally but to the entire state and country.

◆

The following tabulation gives the distance in miles of Range towns from Duluth:

TOWN	RANGE	RAILROAD	DISTANCE
Ely	Vermilion	D. & I. R.	116
Tower	Vermilion	D. & I. R.	98
Allen Junction	Junction Point	D. & I. R.	73
Two Harbors	Ore Docks	D. & I. R.	27
Biwabik	Missabe	D. & I. R.	87
Biwabik	Missabe	D. M. & N.	78
Virginia	Missabe	D. & I. R.	97
Virginia	Missabe	D. M. & N.	72
Eveleth	Missabe	D. & I. R.	100
Eveleth	Missabe	D. M. & N.	69
Mountain Iron	Missabe	D. M. & N.	72
Chisholm	Missabe	D. M. & N.	81
Hibbing	Missabe	D. M. & N.	84
Marble	Missabe	D. M. & N.	77
Taconite	Missabe	D. M. & N.	82
Coleraine	Missabe	D. M. & N.	86

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